

Two species of this genus, both inhabiting Borneo, have previously been described. The present one agrees with them in all its essential characters, but is much larger, and, indeed, is by far the largest of the great *Lachnosterna* group known to me. In its general form and colour it is like *O. princeps*, Sharp, but the long erect hairs with which the upper surface bristles distinguish it from all its congeners, now three in number. These hairs arise from very large punctures which are scattered irregularly over the prothorax and front of the head, but upon the elytra are confined to the smooth slightly elevated costæ. Another peculiar feature is found in the shape of the prosternal process, which has the unusual form of a transversely placed crescent, the two extremities of which are acutely pointed but not much elevated.

A single specimen was found by Mr. Charles Hoop.

*Octoplasia prolifica*, sp. n.

Valde elongata, castanea, capite nigro, femoribus flavis, supra glabra, pectore dense flavo-hirto; capite lato, clypeo leviter bilobato, impunctato, margine reflexo, fronte crebre punctata, lateribus parcissime sed longe hirsutis; prothorace grosse sat crebre punctato, medio paulo impresso, lateribus crenatis, piliferis, regulariter arcuatis, haud angulatis, angulis anticis acutis, posticis rotundatis; scutello grosse punctato; elytris longi-simis, lævibus, parum punctatis, costis sat distinctis, fere impunctatis, marginibus exterioribus haud reflexis; pygidio fortiter crebre punctato; processu prosternale breve, conico.

Long. 36 mm.; lat. max. 15 mm.

*Hab.* Borneo, Kina Balu (*Whitehead*).

I have seen only a single specimen of this also. It is another large species, but is chiefly noticeable for its great elongation, the elytra being four times the length of the prothorax. They have no silky bloom like *O. gigantea*, and their puncturation is rather feeble. Their lateral margins are bordered with a rather wide membrane, but are not reflexed, as in the other species.

XIII.—*On the Bats of the Genera Micronycteris and Glyphonycteris.* By KNUD ANDERSEN.

I. MICRONYCTERIS, Gray.

1856\*. *Schizostoma*, P. Gervais, Expéd. Castelnau Amérique du Sud, Mamm., livraison 15, sheet 7, p. 49.—Type: *Schizostoma minutum*.

\* The titlepage of the volume is dated 1855; on the probable dates of publication of the livraisons see C. Davies Sherborn and B. B. Woodward, *Ann. & Mag. N. H.* (7) viii. p. 164 (Aug. 1901).

Name preoccupied by *Schizostoma*, Bronn, 1835, a genus of Mollusen.

1866. *Micronycteris*, J. E. Gray, P. Z. S. p. 113.—Type: *Micronycteris megalotis*.

The subjoined characterization is confined to the features in which *Micronycteris* differs from *Glyphonycteris*:—

*Skull*\*.—Facial portion, immediately in front of orbits, not conspicuously inflated. Basisoccipital pits, antero-internally to cochleæ, shallow.

*Dentition* †.— $i^2$  not especially modified (compare *Glyphonycteris*). Upper canines not shortened, their vertical being about twice their antero-posterior basal diameter. The "heel" of  $p^5$  represented only by a very narrow cingulum. Inner border of the cingulum of  $p^4$  with a distinct shallow emargination, dividing the cingulum into an antero-internal ("cusp 6" ‡) and a postero-internal tubercle ("cusp 7").

*Ears*.—Conjoined by a transverse band across the head. Outer margin of ear-conch not distinctly concave in its upper half.

*Chin*.—A triangular naked space (in skins and alcohol specimens often contracted to a deep furrow), flanked by two oblique warts, converging downwards.

*Wings*.—Third and fourth metacarpal subequal in length, fifth the longest. First and second phalanx of third digit subequal.

*Species*.—Four species were catalogued by Dobson in 1878: *M. hirsuta*, *megalotis*, *minuta*, *Behni*. Since that time the following three species have been described: *M. brachyotis* (Dobson, 1879), *M. microtis* (Miller, 1898), *M. hypoleuca* (J. A. Allen, 1900). I have satisfied myself that *M. Behni* is a *Glyphonycteris*; the same is probably the case with *M. brachyotis*; and *M. hypoleuca* is apparently indistinguishable from *M. minuta*. The genus *Micronycteris*, as here restricted, therefore comprises the following four species: *M. megalotis*, *microtis*, *minuta*, and *hirsuta*.

*Range*.—From S. Brazil and Peru to Mexico.

\* The skull of *M. minuta* is figured in 'Expéd. Castelnau Amérique du Sud,' Mamm., pl. x. figs. 4, 4a. The skull of *M. megalotis* in Dobson's 'Cat. Chir. Brit. Mus.' pl. xxvi. figs. 3, 3a, 3b (1878); and in Herluf Winge's "Jordfundne og nulevende Flagermus fra Lagoa Santa," E Museo Lundii, ii. pt. 1, pl. i. fig. 1 (1892).

† I write the dental formula of *Micronycteris*, *Glyphonycteris*, and allied genera as follows:— $i^2 \ i^3 \ c \ p^3 \ p^4 \ m^1 \ m^2 \ m^3$ .

‡ On the probable homologies of the cusps of mammalian teeth, see Herluf Winge, "Om Pattedyrenes Tandskifte især med Hen-syn til Tændernes Former," Vidensk. Medd. Naturhist. Foren. Kbhvn. 1882, pp. 15-69, pl. iii.; and a series of papers by the same author in E Museo Lundii.

1. *Micronycteris megalotis*, Gray.

*Teeth*.— $p_2$  higher than  $p_3$  and  $p_4$ ;  $p_3$  and  $p_4$  subequal in height ( $p_3$  often a trifle lower);  $p_3$  in cross-section at base a little smaller than  $p_4$ .— $p^3$  about half the height of the canine;  $p^3$  and  $p^4$  subequal in height. Tip of the principal cusp of  $p^3$  situated only very slightly in front of a vertical line through the middle of the base of the premolar; vertical diameter of  $p^3$  about equal to antero-posterior basal diameter; external surface of  $p^3$  convex.

*Ears*.—Long and broad, reaching beyond the tip of the muzzle when laid forwards. Cross-striae on ear-conch faint and rather ill-defined; number about 13–14; distance between uppermost and lowermost stria about 11 mm.

In the *fully adult male* the transverse band between the ears is triangular in shape, *i. e.* low laterally, triangularly raised in the middle; a small notch at the middle of the upper margin of the band (the top of the triangle). Immediately behind the band, in the fronto-parietal region, a triangular groove bordered by a horseshoe-shaped elevation of the skin; the median, triangularly projecting portion of the band, when laid backwards, fits exactly to the triangular groove, as the lid to a box; tufts of long hairs on the posterior surface of the "lid." The bat is no doubt able to cover and uncover the groove by moving the band forwards and backwards.

In females and young males the transverse band is much lower, not conspicuously higher in the middle than laterally; the frontal groove is absent or, at most, very ill defined.

The frontal groove (which, to my knowledge, has not been described by previous writers) is evidently analogous to the frontal sac in many species of *Hipposiderus*. The position is the same; the long hairs recall the hair-tuft in the *Hipposiderus* sac; and, as in the majority of *Hipposideri*, the apparatus is characteristic of the male sex. A frontal concavity almost identical in structure and position is found in the males of an Oriental species of *Nyctinomus* (*N. johorensis*).

*Nose-leaves*.—Lanceolate long, *i. e.* its extreme length about equal to  $1\frac{1}{2}$  its width at base.

*Wings*.—Forearm practically naked; some short, scattered hairs are observable on very close inspection. Wing-membranes inserted on the ankles or the base of the metatarsus. Length of forearm 31.8–38 mm.

*Foot and calcar*.—The foot is comparatively small, equal to  $\frac{1}{2}$  or  $\frac{3}{5}$  the length of the lower leg. Calcar long, always longer than the foot, and always much more than half the length of the lower leg.

*Tail and interfemoral.*—The postcaudal portion of the interfemoral is longer than the tail, from the anus to the tip of the last vertebra.

*Colour.*—There are two extremes in the colour of the fur:—

(1) Upperside Prout's brown with a tinge of russet; base of hairs pure white or washed with ceru-drab. Underside wood-brown, base of hairs scarcely lighter.

(2) Upperside dull dark brown without any trace of russet tinge; base of hairs pure white or washed with ceru-drab. Underside hair-brown.

The extremes are connected by several transitional stages. The variation in colour is independent of the locality and, as it seems, of the age of the individuals.

*Range.*—The same as that of the genus.

*Remarks.*—The large  $p_3$  and  $p^3$ , the median position of the principal cusp of  $p^3$ , the very small notch at the middle of the upper margin of the ear-band, the practically naked forearm, the long hand, the small foot, long calcar, long postcaudal interfemoral, and darker-coloured underside of the body readily distinguish this species from *M. minuta*. From *M. hirsuta* it differs by its smaller size and higher ear-band, from *M. microtis* by its much darker colour.

### 1 a. *Micronycteris megalotis*, f. *typica*.

1842. *Phyllophora megalotis*, J. E. Gray, Ann. & Mag. N. H. x. (no. 65) p. 257; Dec. 1842.—Type: ♂ imm., in alcohol; Brazil; British Museum (unregistered).

1842. *Phyllostoma elongata*, J. E. Gray, ibid. p. 257: Dec. 1842.—Type: ad., skin; Brazil; British Museum (no. 42. 8. 17. 8). Name preoccupied by *Phyllostoma elongatum*, Geoffroy, 1810. Indistinguishable from the type of *Phyllophora megalotis*.

1855. *Phyllostoma scrobiculatum*, J. A. Wagner, Schreber's 'Säugethiere,' Suppl. v. p. 627.—New name for *Phyllostoma elongata*, Gray (= *Phyllophora megalotis*, Gray).

*Subspecific characters.*—Tooth-rows shorter. Forearm and metacarpals shorter.

*Details.*—This southern form of *M. megalotis* differs from *M. m. mexicana* in the following particulars:—

The skull is slightly smaller (see measurements\*, pp. 64–65); the mandible shorter; *the tooth-rows shorter*; upper teeth 6·8–7·3 mm., as against 7·4–7·8 in *mexicana*. The length of

\* Only the following measurements require some explanation:—*Ears*, length from base of *inner* margin to tip. III.<sup>3</sup>, IV.<sup>2</sup>, V.<sup>2</sup>, measured without the terminal cartilaginous rod. *Skull*, total length and basilar length, to front of canines (not to front of incisors). *Upper and lower teeth*, exclusive of incisors.

the forearm varies between 31·8 and 36·2 mm., in *mexicana* between 35·2 and 38; in the southern form the average is 34·4, in the northern 36. The metacarpals are shorter: in the southern form the third metacarpal measures 25·8–29·8 mm., in *mexicana* 29–32·7.—In every other respect (including the colour of the fur) the two races are alike.

*Specimens examined*.—32, from the following localities:—Pereque, S. Paulo (2); Sumidouro, Minas Geraes (1); S. Lorenço, Pernambuco (2); Chapada, Matto Grosso (2); R. Jurua, Amazonas (2); R. Perene, Junin, Peru (2); Kanuku Mts., B. Guiana (7); S. Esteban, Venezuela (2); Trinidad (2); Tobago (4); “Brazil” or uncertain localities (6).—18 skulls, from practically all the localities enumerated.

*Range*.—From S. Brazil and Peru, through Guiana and E. Venezuela, to Trinidad and Tobago.

### 1 b. *Micronycteris megalotis mexicana*, Miller.

1898. *Micronycteris megalotis mexicana*, Gerrit S. Miller, Proc. Ac. Nat. Sci. Phil. 1898, pt. ii. pp. 329–31; Nov. 8, 1898.—Type: ♀ ad., in alcohol; Plantinar, Jalisco, Mexico; U.S. Nat. Mus.—Separated by Miller on account of its longer wing.

*Subspecific characters*.—Tooth-rows longer. Forearm and metacarpals longer.

*Details*.—See the typical race, above.

*Specimens examined*.—11, from:—Bogota region, Colombia (6); Dueñas, Guatemala (2); Bay of Honduras (1); Mexico (2).—9 skulls, from all the localities enumerated.

*Range*.—From Bogota, through Central America, to Mexico.

*Remarks*.—The examples recorded by Mr. Miller were from various places in S. Mexico (Oajaca, Colima, Jalisco); the British Museum material shows that this larger race has a much wider distribution. Judging from the series available, it would seem that it reaches its climax (*i. e.* its maximum size) in Central America.

Truly intermediate specimens between the southern race and *mexicana* I have not seen; but three skins from Maipure, Orinoco, thus from a border region between the areas of the two races, are *perhaps* intermediate in *external* dimensions (forearm 35–35·8 mm.; third metacarpal 28·7–28·8); the skull of one of the individuals is, however, quite pronounced *mexicana* (upper teeth 7·8 mm.); the two other skulls have been lost.

2. *Micronycteris microtis*, Miller.

1898. *Micronycteris microtis*, Gerrit S. Miller, Proc. Ac. Nat. Sci. Phil. 1898, pt. ii. pp. 328-29, 331; Nov. 8, 1898.—Type: ♂ ad., skin and skull; Greytown, Nicaragua; U.S. Nat. Mus. The only specimen recorded.

The species is known to me from the published account only.

The principal characters, according to Miller, are these:—Ears considerably shorter than in *megalotis*; inner surface of ear-conch with eight sharply defined cross-ridges, crowded into the space of 5 mm.\* Colour of the fur, both dorsally and ventrally, wood-brown, with nearly white bases to the hairs. General size small: forearm 31 mm.

Other external features, as well as the dentition, essentially as in *M. megalotis*.

3. *Micronycteris minuta*, Gervais.

1856. *Schizostoma minutum*, Paul Gervais, Expéd. Castelnau Amérique du Sud, Mamm., livraison 15, sheet 7, p. 50, pl. vii. fig. 1 (whole figure); pl. x. figs. 4, 4a (skull and dentition).—Type from Capella Nova, Brazil; Paris Museum.

‡ 1900. *Micronycteris hypoleuca*, J. A. Allen, Bull. Amer. Mus. N. H. xiii. pp. 90-91; May 12, 1900.—Type: ♀ ad., skin without skull; Bonda, Santa Marta region, Colombia; New York Museum; the only specimen on record.—Characters, according to Dr. Allen: "About the size of *M. minuta*, but white below instead of ashy, and the basal portion of pelage above white instead of ashy white." But British Museum examples (skins) of *M. minuta* from Brazil are,

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\* Are the ears of the type specimen of *M. microtis* undamaged? My reason for raising the question is this:—In the proportionate size of the ears and in the cross-markings of the conch *M. hirsuta* is similar to *M. megalotis*. But in two British Museum examples of *M. hirsuta* the ears are very short, reaching only a little beyond the eyes when laid forwards, and the cross-markings on the inner surface of the conch are very strongly defined and crowded into a space of 6-7 mm.; they are, on the whole, puzzlingly like the type of ear described by Mr. Miller in *M. microtis*. But the ears of these two *M. hirsuta* have indubitably been singed (the bats may have been caught while trying to escape from a burning tree, or, perhaps more likely, been found dead in a hole of a partially burnt-down tree); though very much shrunk they have, however, preserved their original shape; they have simply contracted into scarcely  $\frac{2}{3}$  their natural size, and, as a consequence of that, the cross-markings have become very sharply defined, prominent beyond the plane of the conch, and crowded into a small space, and the ear-conch thick and stiff. Is the same, perhaps, the case with the ears of the only specimen known of *M. microtis*? If so, *M. microtis* is very closely related to *M. megalotis*, differing, as it seems, only in the much lighter colour of the fur (which, however, may be indicative of a light phase only) and, perhaps, a slightly smaller size.



some of them *white*, others greyish white below, and have the base of the hairs of the upperside white. If, therefore, there is no other difference between *M. hypoleuca* and *M. minuta*, the former cannot be distinguished from the latter. I understand from Dr. Allen's description that he had no example of *M. minuta* for comparison.

*Teeth*.— $p_3$  much lower than  $p_4$ , only a little higher than the cingulum of  $p_2$ .— $p^3$  much lower than  $p^4$ , only a little higher than the cingulum of the canine. Principal cusp of  $p^3$  situated near the anterior end of the tooth; vertical diameter of  $p^3$  markedly shorter than antero-posterior basal diameter; external surface of  $p^3$  concave.

*Ears*.—Essentially as in *M. megalotis*: long and broad, extending beyond the tip of the muzzle when laid forwards. Cross-stripe on ear-conch faint and rather ill-defined; number about 11–12; distance between uppermost and lowermost stria about 10 mm.

In the fully adult male the transverse band between the ears is as high as, or, rather, still higher than, in the male of *M. megalotis*; but the median notch is extremely deep, reaching practically to the base of the band, thus *dividing it into two distinct triangular lobes*. A coat of long hairs on the posterior surface of the band. Frontal groove as in the male of *M. megalotis*.

Spirit-specimens of females are not available for examination.

*Nose-leaves*.—Essentially as in *M. megalotis*, but lancet comparatively a trifle shorter, its extreme length being on average equal to about  $1\frac{1}{3}$  its width at base.

*Wings* (compare the wing-indices below, p. 65).—The metacarpals are proportionately shorter than in *M. megalotis*; an inspection of the measurements (below, pp. 64–65) will show that whereas *M. minuta* has the forearm of precisely the same length as *M. m. mexicana*, its metacarpals are as short as in the small southern race, *M. m. typica*; this, together with a shortening of the proximal phalanges, makes as a total result a *proportionately shorter hand in M. minuta*. The second phalanx of the fourth digit is practically equal to the first phalanx (in *M. megalotis* decidedly shorter than the first phalanx).

The muscular part of the forearm is densely haired. Membranes inserted on the ankles or the extremity of the tibia. Forearm 36–37.5 mm.

*Foot and calcar*.—The foot is comparatively large, much more than  $\frac{1}{2}$  the length of the lower leg. Calcar short, always shorter than the foot, and less than  $\frac{1}{2}$  the length of the lower leg.

*Tail and interfemoral*.—The postcaudal portion of the interfemoral is shorter than the tail.

*Colour*.—Above as in *M. megalotis*, below considerably lighter. Upperside Prout's brown, base of hairs white; underside whitish or greyish white in the middle, drab on the flanks.

*Range*.—Brazil, from Santa Catherina in the south to Para in the north. Extending to Colombia, if *M. hypoleuca* is identical with *M. minuta*.

*Specimens examined*.—11, from:—Santa Catherina (3); Para (4); "Brazil" (4).

*Remarks*.—On hasty inspection *M. minuta* bears no small resemblance to *M. megalotis*. The two species are practically alike in the shape of the skull, in the ears and nose-leaves, and in the general size; *M. minuta* is not, as its technical name might suggest, smaller than *M. megalotis*. But *M. minuta* differs in the following important respects:—In the very conspicuous reduction of  $p_3$  and  $p^3$ ; in having the transverse band between the ears divided into two separate triangular lobes; in having the proximal half of the forearm densely haired; in the proportionately shorter hand; in the larger foot, short calcar, short postcaudal interfemoral, and lighter-coloured underside of the body.

#### 4. *Micronycteris hirsuta*, Ptrs.

1869. *Schizostoma hirsutum*, Peters, MB. Akad. Berlin, p. 397.—Type: ♂ ad., in alcohol; locality unknown; Paris Museum.

*Skull*.—Similar in shape to the skull of *M. megalotis* and *M. minuta*, but much larger, and brain-case less vaulted and raised above the facial region, the profile-line, from the uppermost point of the brain-case to the nasals, therefore less concave.

*Teeth*.—Cutting-blade of  $i^2$  markedly less compressed antero-posteriorly than in *M. megalotis* and *minuta*. Upper premolars as in *M. megalotis*. Almost the same is the case with the lower premolars:  $p_2$  slightly higher than  $p_4$ , which is slightly higher than  $p_3$ .

*Ears*.—Proportionate size as in *M. megalotis* and *minuta*; number of cross-ridges 13-14, covering a space of about 11 mm.

Transverse band between ears, in both sexes, very low, straight (not higher in the middle), and without median notch. There seems to be no frontal groove (the two specimens examined of this very rare bat are in a bad state of preservation).



*Nose-leaves*.—Lanct proportionately shorter, its extreme length only a little longer than its width at base.

*Wings*.—Wing-structure almost precisely as in *M. megalotis*, the only noteworthy difference being the somewhat shorter metacarpals.

Forearm haired almost to the extremity. Membranes inserted very nearly on the ankles. Forearm 43·5–45 mm.

*Calcar*.—Slightly longer than the foot.

*Specimens examined*.—Poço Azul, Costa Rica, 200 m. (♂ ad., ♀ ad.). One skull.

*Range*.—As yet known from Costa Rica only.

*Remarks*.—The large size of *M. hirsuta* prevents its confusion with any other species of the genus.

## II. GLYPHONYCTERIS, THOS.

1896. *Glyphonycteris*, Oldfield Thomas, Ann. & Mag. N. H. (6) xviii. pp. 301–2; Oct. 1, 1896.—Type: *Glyphonycteris sylvestris*.

*Skull*.—Facial portion, immediately in front of orbits, very conspicuously inflated. Anterior nasal openings more horizontal in position than in *Micronycteris*, directed chiefly upwards. Basioccipital pits, antero-internally to cochleæ, very deep.

*Dentition*.— $i^2$  very pronouncedly chisel-shaped, its cutting-blade broad from side to side, extremely thin antero-posteriorly. Canines short, their antero-posterior basal about equal to their vertical diameter. Inner cingulum of  $p^3$  developed into a conspicuous rather broad “heel”; tip of the principal cusp of  $p^3$  anterior in position, situated in a vertical line through the *front end* of the base of the premolar; antero-posterior basal much longer than vertical diameter. *Inner margin of the cingulum of  $p^4$  convex; no distinct “cusp 6.”*

*Ears*.—Not conjoined by a transverse band across the head. Outer margin of ear-couch distinctly concave in its upper half.

*Chin*.—As in *Micronycteris*.

*Wings*.—Third and fifth metacarpal subequal in length, *fourth the shortest*. Second phalanx of third digit from  $1\frac{1}{2}$  to  $1\frac{3}{4}$  the length of the first phalanx.

A comparison with *M. megalotis* and *hirsuta* (in *M. minuta* the hand is peculiarly shortened) will readily show how this modification of the wing-structure has been effected (see wing-indices, below, p. 65):—In *Glyphonycteris* the fourth metacarpal has, very nearly, the same proportionate length as in *M. hirsuta*, whereas the fifth and, still more, the third

have increased in length, making as a total result the fifth and third metacarpal subequal, the fourth the shortest. In *Glyphonycteris* the first phalanx of the third digit is shortened, the second correspondingly lengthened; in other words, the joint between the two phalanges has been removed in proximal direction (compare wing-indices of *Glyphonycteris* and *M. megalotis*). The joint between the first and second phalanx of the fourth digit has been similarly removed in proximal direction, making the latter phalanx decidedly longer than the former.

*Species*.—The genus was based on *G. sylvestris*. An examination of the British Museum material has convinced me that Peters's *M. Behni* is a *Glyphonycteris*; the same is probably the case with Dobson's *M. brachyotis*.

*Range*.—From Brazil (Matto Grosso) and Peru through Guiana to Central America.

### 1. *Glyphonycteris Behni*, Ptrs.

1865. *Schizostoma Behni*, Peters, MB. Akad. Berlin, pp. 505-8.—  
Type: ♀ ad., in alcohol; Cuyabá, Brazil.

*Skull and teeth*.—See the diagnosis of the genus.

*Ears*.—Short; not reaching the tip of the muzzle when laid forwards. Cross-stripe faint, rather ill-defined; number about 10 (?), covering a space of about 9 mm.

*Nose-leaves*.—Essentially as in *M. megalotis*, the extreme length of the lancet being equal to about  $1\frac{1}{2}$  its width at base.

*Wings*.—Forearm practically naked. Membranes from the ankles. Length of forearm about 45-47 mm.

*Calcar*.—Shorter than the foot and very nearly equal to half the length of the lower leg.

*Tail and interfemoral*.—The postcaudal interfemoral seems to be equal to the length of the tail (the available specimens are somewhat damaged).

*Specimens examined*.—River Cosnipata, District of Puno, S.E. Peru (2, skins in alcohol). One skull.

*Range*.—As yet only recorded from Cuyabá (Matto Grosso) and Cosnipata.

### 2. *Glyphonycteris sylvestris*, Thos.

1896. *Glyphonycteris sylvestris*, Oldfield Thomas, Ann. & Mag. N. II. (6) xviii. pp. 302-3; Oct. 1, 1896.—Type: ♂ ad., skin; Miravalles, Costa Rica; British Museum (no. 96. 10. 1. 2).

*Specific characters*.—Similar to *G. Behni*, but smaller. See the measurements below, pp. 64-65.

*Colour*.—Hairs of upperside with four alternating rings of dark brown and whitish; the extreme base, next to the skin, white; a broad ring of blackish brown; a broad ring of white or yellowish white; narrow tips of hairs approaching clove-brown. Fur of underside dark brown at base, greyish drab at tip.

*Range*.—As yet only known from the type specimen, obtained at Miravalles, Costa Rica.

### 3. *Glyphonycteris brachyotis*, Dobson.

1879\*. *Schizostoma brachyote*, Dobson, P. Z. S. 1878, p. 880.—Type from Cayenne; Paris Museum; the only specimen on record.

The species is known to me from the published account only.

Dobson did not examine the skull; the dentition is not described in detail; the presence or absence of a transverse band between the ears is not mentioned, nor is there any accurate information as to the proportionate length of the metacarpals.

Notwithstanding these deficiencies in the description of the species, I think there can be little doubt that it is a member of the genus *Glyphonycteris*:—(1) The cusp of the first upper premolar ( $p^3$ ) is, according to Dobson, "very oblique, touching the canine"; this probably means that the tooth is remarkably long in antero-posterior direction, and the cusp situated at the front end of the tooth, as in *Glyphonycteris*: (2) the ears ("much shorter than head," tip "obtusely pointed") are as in *G. Behni*, not as in a *Micronycteris*: (3) Dobson's omission of any reference to the ear-band is probably an indication that it is absent: (4) the second phalanx of the third digit is much longer than the first phalanx, also one of the features of *Glyphonycteris* in contradistinction to *Micronycteris*: (5) unfortunately Dobson only gives measurements of the third and fifth digits, but the wing-indices, as derived from these measurements, are more in accordance with those of *Glyphonycteris* than with those of *Micronycteris*.

*G. brachyotis* seems to be precisely of the same size as *G. sylvestris*, but the calcar is stated to be longer than the foot.

*Range*.—Cayenne.

\* The paper was read before the Zoological Society on Nov. 5, 1878, but probably not published until April 1879.

*Synopsis of the Forms.*

- $p^4$  with a distinct cusp 6. ( $i^2$  not very pronouncedly chisel-shaped.) Basisoccipital pits shallow. A transverse band between the ears. 3rd and 4th metacarpals subequal, 5th the longest. First and second phalanx of third digit subequal . . . . . *Micronycteris*.
- Ears extending beyond the tip of the muzzle when laid forwards.
- Smaller: Maxillary tooth-row about 6.5-8 mm. Forearm about 31-38.
- $p_3$  as high as  $p_4$ .  $p^3$  as high as  $p^4$ . Transverse band between ears undivided. Calc. longer than foot (c. u.). Post-caudal interfemoral longer than tail. Forearm practically naked. Underside of body darker . . . . . *M. megalotis*.
- Maxillary tooth-row 6.8-7.3. Forearm 31.8-36.2 . . . . . *M. m. typica*.
- Maxillary tooth-row 7.4-7.8. Forearm 35.2-38 . . . . . *M. m. mevicana*.
- $p_3$  much lower than  $p_4$ .  $p^3$  lower than  $p^4$ . Transverse band between ears divided by a deep median notch into two triangular lobes. Calc. shorter than foot. Post-caudal interfemoral shorter than tail. Muscular part of forearm haired. Underside of body lighter . . . . . *M. minuta*.
- Larger: Maxillary tooth-row about 9.5. Forearm about 43.5-45 . . . . . *M. hirsuta*.
- Ears not extending beyond the tip of the muzzle when laid forwards\*. Cross-ridges on ear-conch sharply defined, crowded\*. Fur wood-brown. Small: forearm about 31 mm. . . . . *M. microtis*.
- No distinct cusp 6 to  $p^4$ . ( $i^2$  very pronouncedly chisel-shaped.) Basisoccipital pits very deep. No transverse band between the ears. 3rd and 5th metacarpals subequal, 4th shortest. Second phalanx of third digit considerably longer than first . . . . . *Glyphonycteris*.
- Calc. shorter than foot. Forearm 45-47 mm. . . . . *G. Behvi*.
- Forearm about 40.5 mm. . . . . *G. sylvestris*.
- Calc. longer than foot. Forearm about 40.5 mm. . . . . *G. bruchyotis*.

*General Remarks.*

\* *M. megalotis*.—The two races of *M. megalotis* are of some interest from a distributional point of view. A vast longitudinal tract of S. America, from the Llanos of Venezuela to the Pampas of Argentina—now the Orinoco Valley, the Upper Amazons with numerous affluents, and the Parana River system—was, as well known, in a late geological epoch

\* See footnote on p. 55.

a sea, which, however, probably was subdivided into a northern and southern portion, communicating by a comparatively narrow sound between the Central Brazilian and Bolivian highlands. *The bed of the northern part of this ancient sea forms, approximately, the geographical line of separation between the two races of M. megalotis*: broadly speaking, we find south, south-east, and east of that line (Brazil, Guiana, Venezuela) *M. m. typica*; west and north-west of the ancient sea-bed (Colombia, through Central America to Mexico) *M. m. mexicana*.—Later on, the passage from the Central Brazilian highlands must have been easy to Bolivia and Peru, likewise from Venezuela some distance north-westwards (and to coast-islands, as Trinidad and Tobago). That on other points, too, some shifting of the areas in the course of time has taken place is only what was to be expected. It is, no doubt, in a comparatively late period that the species has spread through Central America to Mexico.

*M. minuta*.—*M. minuta* is very closely related to *M. megalotis*; the complete resemblance in the skulls, in the ears and nose-leaves, the strong development of the ear-band, and the presence of a frontal groove in both species tend to show that their common origin cannot lie very far back. But in the strong reduction of  $p_3$  and  $p^3$  *M. minuta* has reached a higher stage than any other species of the genus. The more complicated ear-band (probably making the ears more independent of each other in their movements) and the shortening of the tail are also evidences of a higher specialization.

*M. hirsuta*.—So far as the premolars are concerned, *M. hirsuta* is practically on the same level as *M. megalotis* (though there is, perhaps, a slightly more pronounced tendency to reduction of  $p_3$ ). But the inner upper incisors ( $i^2$ ) are much less compressed antero-posteriorly, thus without that approximation to chisel-shape so evident in the other species; the skull is less vaulted; and the band between the ears very low. Its origin from the *Micronycteris* stem may, therefore, be assumed to date back to a time when these three peculiarities were not carried so far as in the now living *M. megalotis*.

*Glyphonycteris*.—Some of the peculiarities which entitle *Glyphonycteris* to the rank of a distinct genus are already foreshadowed in *Micronycteris*. In *M. megalotis* and *minuta* the cutting-blades of the upper inner incisors ( $i^2$ ) are conspicuously compressed in antero-posterior direction; in *Glyphonycteris* this feature is carried to an extreme. In *M. minuta* the principal cusp of  $p^3$  is situated very near the

front of the tooth and the vertical is shorter than the antero-posterior basal diameter; the same is the case in *Glyphonycteris*, but at the same time the inner eugulum (heel) of  $p^3$  is more developed. The canines and premolars, both in the upper and lower jaw, are peculiarly low, and the antero-internal tubercle of  $p^4$  (cusp 6) has disappeared (probably fused with cusp 7). In all these features *Glyphonycteris* has evidently arrived at a higher degree of specialization than *Micronycteris*.—The shallow depressions in the basioccipital of a *Micronycteris* have become deep pits in *Glyphonycteris*; the anteorbital region is inflated. This, too, is a further development of peculiarities already present, to some small extent, in *Micronycteris*.—Certain external characters also bear evidence of a higher specialization: the lengthening of the fifth and third metacarpals (making the fourth the shortest) and the lengthening of the second phalanges, more particularly the second phalanx of the third digit.—But in one respect, at least, *Glyphonycteris* seems to be more primitive than any known *Micronycteris*: in *Glyphonycteris* there is no transverse band between the ears; in *M. hirsuta* the band is low, in *M. megalotis* high, in *M. minuta* both high and complicated in structure.

The general result of the study of *Glyphonycteris* may be epitomized as follows:—It has probably originated from the *Micronycteris* stem at a period when the transverse band between the ears was still not developed; in certain characters of the skull, in the dentition, and wing-structure it has taken a course of its own, thereby partly further developing such peculiarities as can already be traced in *Micronycteris*.—The three species of *Glyphonycteris* are very closely allied.

The probable interrelations of the bats reviewed above are illustrated in the subjoined diagram:—





Table of Measurements.

	<i>M. megalotis.</i>		<i>M. microtis.</i>	<i>M. minuta.</i>	<i>M. kirsata.</i>	<i>G. Behni.</i>	<i>G. sylvestris.</i>	<i>G. brachyotis.</i>
	<i>f. typica.</i> 30 adults, 18 skulls.	<i>maricana.</i> 10 adults, 9 skulls.						
Ear-conch, length	Min. 15	Min. 15	mm.	Min. 15.8	Min. mm.	Min. mm.	mm.	mm.
" width	Max. 18	Max. 17.5	mm.	16	mm.	mm.	mm.	mm.
Tragus, length	13	14	9 [1]	14	mm.	14	mm.	mm.
Launcet, length	4.8	5.2	5.8	5	mm.	12	mm.	12.7
" width	6.5	7.8	.....	6	mm.	5.2	mm.	mm.
Horse-shoe, width	4.3	5.2	.....	4.2	mm.	6	mm.	6.2
Forearm	4.2	5.2	.....	5	mm.	4	mm.	mm.
3rd metacarpal	31.8	35.2	31	4.8	mm.	4.8	mm.	mm.
111.1	25.8	29	26	37.5	mm.	4.5	mm.	4.6
111.2	19.2	13.7	26	29	mm.	2.15	mm.	40.6
111.3	12.8	15.3	12.6	11	mm.	35.8	mm.	35.6
111.4	7	8.5	11	11.8	mm.	18	mm.	14
11th metacarpal	26	30.3	7	7	mm.	16.8	mm.	17.8
14.1	9.8	11.7	.....	8.5	mm.	10	mm.	8.9
14.2	8.2	10	.....	9.5	mm.	35.2	mm.	35.8
14.3	28.2	31.2	.....	9	mm.	12.8	mm.	10.7
V.1	10	11.7	.....	9.3	mm.	11	mm.	12.5
V.2	7.5	9.7	.....	7.2	mm.	38.5	mm.	36
			.....	8.8	mm.	14.2	mm.	10
			.....	7.2	mm.	10.8	mm.	10.7
			.....	8.8	mm.	9.5	mm.	11.1

